

NOTES ON THE GENERA ARCHIDENDRON F.V. MUELLER AND PITHECELLOBIUM MARTIUS IN MAINLAND S.E. ASIA

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ABSTRACT: The generic limits of the Asian *Ingeae* (*Leguminosae-Mimosaceae*) is briefly discussed. The genus *Archidendron* is extended to comprise all the species formerly included in *Pithecellobium* sect. *Clypearia* Benth and *Abarema* sensu Kostermans, *Cylindrokelupha* Kostermans, *Paralbizia* Kostermans, *Zygia* sensu Kostermans. A key to and an enumeration of the Mainland S. E. Asian *Archidendron* and *Pithecellobium* species is presented.

RÉSUMÉ : Discussion des limites génériques des *Ingeae* (*Leguminosae-Mimosaceae*) asiatiques. Le genre *Archidendron* est élargi et comprend toutes les espèces jusqu'alors incluses dans les genres *Pithecellobium* sect. *Clypearia* Benth, *Abarema* sensu Kostermans, *Cylindrokelupha* Kostermans, *Paralbizia* Kostermans, *Zygia* sensu Kostermans. Clé et énumération des espèces d'*Archidendron* et *Pithecellobium* du S.E. asiatique.

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INTRODUCTION

This paper is the concentrate of a Ph. D.-thesis on the genus « *Pithecellobium* » in Mainland S. E. Asia, carried out at the Botanical Institute, University of Aarhus (AAU).

The paper is a precursor to the two floras: Flore du Cambodge, du Laos et du Viêt-Nam and Flora of Thailand, where detailed bibliographic references, synonymy and full descriptions will appear. A mimeographed list of specimens studied is obtainable at the address of the author.

During this study I have visited the herbaria of BM, C, K, L, P and I wish to thank for the hospitality, help and advice I have enjoyed during these stays. Special thanks to Mr. FORMAN and Dr. POLHILL, Kew and Dr. VIDAL, Paris for advices and fruitful discussions.

I also wish to express my gratitude towards the Directors, Keepers and Curators of the following herbaria who put plenty of material at my disposal: A, AAU, ABD, BM, BKF, BR, C, E, GB, GH, K, L, NY, P, SING, U, US (The abbreviations are those of: HOLMGREN & KEUKEN, Index Herbarium ed. 6, Regnum Vegetabile 92: 397, 1974).

Finally I wish to express my gratitude to professor Kai LARSEN for critical advice and encouragement during this study and Dr. B. HANSEN, Botanical Museum, Copenhagen, for valuable advice, during the preparation of the manuscript, to Mrs. FOX-MAULE, M. Sc. for latinizing the new species.

MORPHOLOGY (table 1)

The S. E. Asian representatives of the genus consist of unarmed, small trees or shrubs with inconspicuous stipules. The leaves are bipinnate and the number of pinnæ is most often very low, 1-2 pairs. In species with many pairs of pinnæ, the number may be reduced in the upper leaves just below the inflorescence. The number of pinnæ is thus a bad key-character. The number of leaflets varies to the same degree. Rachis and pinnæ are mostly glandular. The gland is rather constant in position, but may vary considerably in size and shape. The most extreme variation can be seen in *A. clypearia* where the rachis glands may be long and slitlike, elliptical to circular, sessile to stalked, flat to concave to urceolate. In other species the glands are rather constant in form and furnish good diagnostic characters (f. ex. *A. glomeriflorum*, *A. kerrii*, *A. poilanei*, *A. conspicuum*, *A. chevalieri*).

The venation of the leaflets is always pinnate with up to 4 generations of veins but may show some valuable diagnostic characters. The tertiary veins of *A. chevalieri* and *A. eberhardtii* are parallel, anastomose and connect the secondary ones, giving the whole leaflet a "melastomataceous" venation-pattern. In other species as *A. monadelphum*, *A. pahangense* and *A. quocense* the secondary, tertiary and quaternary veins anastomose to form a dense reticulated pattern.

The inflorescence(s) are always panicles, mostly in the axils of the upper leaves or terminal. In three species the inflorescence can be found below the leaves at the old leaf scars: *A. jiringa*, *A. robinsonii* and *A. eberhardtii* but at the first two mentioned, they can be axillary at the young leaves as well. The panicle may have 1 generation of branches in the lower part or it may be unbranched. Poorly developed inflorescences are nearly always unbranched. The peduncles are often more clustered together in a serial arrangement, the upper ones first flowering.

There is, in contrary to *Albizia*, only one kind of flowers in the heads (sessile flowers) or corymbs (pedicellate flowers). The flower size and form are rather constant as is the indumentum. A good character was also found by comparing the length of the corolla tube with that of the staminal tube. The staminal tube is either as long as or shorter than the corolla tube. The ovary furnishes good diagnostic characters being hairy or glabrous, sessile or stipitate.

The pod shows the biggest variation in form and size being adapted to different dispersal agents. It is \pm dehiscent. In species no. 1-11 and 13-16 the pods are reddish orange inside and the seeds have from a bluish-black sarcotesta to a thinner, black, smooth, crustaceous one. This combination gives bright contrasting colours when the seeds are dangling from the funicle after dehiscence and it is a clear adaptation to bird-dispersal as indicated by PUL (1956).

Another group of species, *A. balansæ*, *A. poilanei*, *A. tonkin nse*, *A. robinsonii*, *A. chevalieri*, *A. kerrii* and *A. eberhardtii* has cylindric pods

TABLE I

GENUS	<i>Albizia</i> sect. <i>Albizia</i>	<i>Serialbizzia</i>	<i>Cathormion</i>	<i>Pithecellobium</i> sens. strict.	<i>Painteria</i> (Ceylon)	<i>Thalearadopsis</i>	<i>Abarema</i> sensu Kostermans	<i>Cylindrokelupha</i>	<i>Paralbizzia</i>	<i>Zygia</i> sensu Kostermans	<i>Archidendron</i>
CHARACTER											
Stipules spinescent	(+) -	-	+	+	+	+	+	-	-	+	-
Cauliflory	(+)	(+)	-	-	-	-	(+)	(+)	-	+	(+)
Floral dimorphy	(+)	(+)	+	-	-	-	-	-	-	(+)	(+)
Flower pluricarpellate	-	-	+	-	-	-	-	+	-	-	+
Pod straight	+	+	+	+	+	(+)	+	+	+	+	+
Pod contorted	-	-	+	+	+	(+)	+	+	+	+	(+)
Pod dehiscent	(+)	-	(+)	+	+	+	+	(+)	-	+	-
Seeds with aril	-	-	-	+	+	+	+	-	-	-	-
Seeds with pleurogram	+	+	+	+	+	+	-	-	-	-	-
AUTHOR											
Bentham (1875)	Alb.	P. (1) Clyp.	P. Sam. Cath.	P. U.-c. P.	P. (2) Sam. Paint. Zygia P.	Acacia	P. Clyp. Abar. Cyl. P.	P. Clyp. Cyl. P.	Para. Zygia P.	P. Clyp. Zygia P. Zygia	Arch. Arch. P. Arch.
Kostermans (1954)											
Mohlenbrock (1963)	Alb.	Ser.	Cath.	P.	P.						
Hutchinson (1964)	Alb.	P.	Cath.	P.	P.						
Genus proposed	Alb.	Alb.	Cath.	P.	P.	P.	Archidendron				

NB: irregularly dehiscent.

BENTHAM (1875) genera and sections: *Albizia* (Alb.), *Archidendron* (Arch.), *Pithecolobium* (P.); Sect. 1. *Unguis-cati* (U.-c.), Sect. 2. *Clypearia* (Clyp.), Sect. 4. *Samanea* (Sam.). — KOSTERMANS (1954) genera: *Abarema* (Abar.), *Cathormion* (Cath.), *Cylindrokelupha* (Cyl.), *Painteria* (Paint.), *Paralbizzia* (Para.), *Pithecolobium* (P.), *Serialbizzia* (Ser.), *Zygia*. — MOHLENBROCK (1963) genera: *Pithecolobium* (P.), *Cylindrokelupha* (Cyl.), *Zygia*, *Cathormion* (Cath.), *Serialbizzia* (Ser.), *Albizia* (Alb.). — HUTCHINSON (1964) genera: *Archidendron* (Arch.), *Albizia* (Alb.), *Zygia*, *Pithecolobium* (P.), *Cathormion* (Cath.).

(1) As *P. confertum* Bentham (= *Albizia splendens* Miquel).

(2) *Pithecolobium nitidum* (Vahl) Bentham (= *Painteria nitida* (Vahl) Kostermans) as a synonym under *Pithecolobium umbellatum* (Vahl) Bentham.

with coriaceous to woody valves and seeds with a hard sclerotesta occupying the entire cavity of the pod. The seeds are generally larger than in the first group and the colours are normally brownish. No field notes exist on the dispersal of the seeds of this group, but they are probably dispersed by animals as they are rather heavy.

In *A. jiringa* the pods have thickly coriaceous valves and the seeds are big with a brownish, thin, hard testa. They are said to be dispersed by tree mammals (PUL, l.c.).

A. turgidum has straight pods with valves who are reddish inside and seeds with a thin, hard, brownish, smooth testa. The seeds are exposed after dehiscence dangling from a slender funicle. No fields notes on dispersal agent.

Seeds with funicular aril are found in *Pithecellobium sensu stricto* (*Pithecellobium* sect. *Unguis-cati* Benthams). CORNER (1976: 165, fig. 319) reports a vestigial exostomal aril in *Archidendron solomonense* Hemsley. But I have observed no arils in indigenous Mainland S. E. Asian representatives. The seeds of the *Ingeæ* fall in two categories those with *pleurogram* and *linea fissura* (BOELCKE 1946; CORNER 1951, 1976; VASSAL, 1971) and those without. Seeds with *pleurogram* are found in *Albizia* sect. *Albizia* (incl. *Serialbizzia* Kostermans), *Serianthes* Benthams, *Pithecellobium sensu stricto* (incl. *Painteria* Britton & Rose and *Thailandopsis* Kostermans), *Cathormion* Hasskarl and *Samanea* Merrill. Seeds without *pleurogram* are found in *Archidendron* (incl. *Abarema* sensu Kostermans, *Paralbizzia* Kostermans, *Cylindrokelupha* Kostermans, *Zygia* sensu Kostermans) and *Albizia* sect. *Platysperma* Benthams.

POLLEN : The family was studied by SORSA (1969) and GUINET (1969). Only GUINET studied S. E. Asian representatives of the genus. One of the conclusions of GUINET was that the genera *Abarema sensu* Kostermans and *Archidendron* are overlapping in the characters; thickness of the exine and height of the columellas. (GUINET, 1969: fig. 25). These characters support the combination of the two genera made in the present paper.

HISTORY

BENTHAM (1875) based the classification of the *Ingeæ* on the number of generations of pinnæ, ovaries per flower, texture, form and dehiscence of the pod. It is interesting to note that BENTHAM (*op. cit.*: 343) says that the *Ingeæ* has "15 genera or subgenera". Many authors, f. ex. BAKER (1878), TAUBERT (1894), PRAIN (1897), RIDLEY (1922), BRENNAN (1959), HUTCHINSON (1964) have mainly followed the classification of BENTHAM as did STANDLEY (1927), MACBRIDE (1943) and WOODSON & SCHERY (1950) in local American floras.

BRITTON & ROSE (1928) were the first to split up *Ingeæ* in small genera.

They worked on American material only. Similar views were held by BRITTON & KILLIP (1936) and KLEINHOONTE (1940). The base of this classification is the nature of the stipules, position of the inflorescence, texture, dehiscence and form of the pod, aril of the seeds present or not. Even the number and form of leaflets was used as a generic character.

The spirit of BRITTON & ROSE (*l.c.*) is also found in KOSTERMANS (1954, 1956, 1960, 1966), who recognized 11 genera in the Old World excluding true *Pithecellobium* from the region.

MOHLENBROCK (1963) presented a "Reorganization of Genera within Tribe *Ingeæ* of the Mimosoid *Leguminosæ*". The classification was based on mode of dehiscence, form and structure of the pod. MOHLENBROCK recognized 21 genera (11 from the Old World).

Table 1 shows some of the characters used in the classification of the genera hitherto described from Mainland S. E. Asia, together with the concepts of BENTHAM (1875), KOSTERMANS (1954), MOHLENBROCK (1963) and HUTCHINSON (1964) as well as my own opinion of the affinities of the genera.

DISCUSSION

It is not easy to accept the conservative classifications of BENTHAM and HUTCHINSON without modification because *Pithecellobium* sensu BENTHAM and HUTCHINSON contains much more variation than the whole remaining part of the *Ingeæ*. Comparing the whole aggregate of *Ingeæ* with bipinnate leaves with the rest of the *Mimosaceæ* could lead to the conclusion that they should be treated as one genus. Both F. v. MUELLER (1872) and KURZ (1876) combined *Albizia* and *Pithecellobium*. The same criterion of generic delimitation has been used in *Acacia*, *Inga* and *Cassia*, all large, tropical genera. Nomenclaturally this would necessitate several new combinations and result in a large (ca. 400 species) rather heterogeneous genus.

The other course adopted is splitting the representatives up in several small "organ-genera" based on fruit-morphology as have been done by BRITTON & ROSE (1928), KOSTERMANS (1954) and MOHLENBROCK (1963). A consistent splitting according to fruit characters would "create" several genera, which could only be recognized in fruit and reflect the adaptation to dispersal agents only.

I have here followed an intermediate course in referring the Asian-Malesian *Ingeæ* with opposite leaflets, uniform flowers, seeds without aril and pleurogram to the genus *Archidendron*, whereas the *Ingeæ* with opposite leaflets, flowers in heads, heteromorphic flowers (e.g. a differentiation of the central flowers of the head compared to the marginal ones), seeds without aril, but with pleurogram are referred to the genus *Albizia*.

DE WIT (1942, 1952) pointed out that the striking character in *Archidendron* is, that it has more than 1 ovary per flower. MOHLENBROCK

(1966) found that *Archidendron tenuiracemosum* and *Pithecellobium dewittianum* both have 1-2 ovaries per flower breaking down the distinction between *Pithecellobium* sect. *Clypearia* Benth. and *Archidendron*. The other character mentioned by DE WIT, the unisexual flowers, mostly found in the genus *Archidendron*, is also found in *Archidendron harmsii* v. Malm which has only 1 ovary per flower and was referred to the genus *Pithecellobium* by DE WIT (1942).

MOHLENBROCK (1963, 1966) treated *Archidendron* as a section under *Pithecellobium*. The genus *Pithecellobium* is based on *Pithecellobium unguis-cati* Bentham from Central and S. America. The American representatives are characterized by spinescent stipules, uniform flowers, seeds with aril and pleurogram (CORNER, 1952, 1976; BOELCKE, 1946; VASSAL, 1971), forming an entity different from the Asian-Australian species referred to the genus by MOHLENBROCK. If *Archidendron* with its unarmed stems, seeds without aril and pleurogram were combined with that genus, the result would be that one also had to sink *Albizia* in it (usually but not always unarmed stems and seeds without aril but with pleurogram), and this again would lead us to combine all the *Ingeae* with 2-pinnate leaves in 1 genus: *Albizia*, against which I have written above.

The following genera recognized by KOSTERMANS (1954) is referred to *Archidendron*:

a. — *Abarema sensu* Kostermans: The main part of Asiatic species belonging to *Pithecellobium* sect. *Clypearia* of BENTHAM (1875) was applied to the American genus *Abarema* Pittier. The type of this genus was selected by COWAN (1959: 58) as *Abarema trapezifolia* Pittier. The latter species, however, has floral dimorphy. Moreover the seeds have a slightly dilated funicle, a pleurogram and are without the black testa, which is characteristic for sect. *Clypearia* Bentham. I have not seen any Asian species with the "Abarema" character and find that KOSTERMANS (1954) misapplied the genus.

b. — *Cylindrokehupha* Kostermans: Based on *C. bubalina* (Jack) Kosterm. having straight pods with thick valves, which are reddish inside. The turbinate-truncate seeds are occupying the entire cavity of the pod. The testa of the seeds is black and crustaceous, without pleurogram. The seeds are dangling from the funicle after the dehiscence. The flowers are uniform, in heads. Because of pod and seed morphology, the Indo-Chinese species *A. balansæ* and *A. robinsonii* were included in *Cylindrokehupha*. The seed testa of these two species is thicker and the pods are greyish inside, the seeds are falling to the ground after the dehiscence.

c. — *Paralbizia* Kostermans: Based on *P. turgida* (Merrill) Kostermans. The species has uniform flowers, the pod is straight, the valves are reddish orange within and the seeds have a brownish, thin testa without pleurogram.

d. — *Zygia sensu* Kostermans: The type of this genus is the American *Z. latifolia* Fawcett & Rendle. The Asian-Australian representatives are four and constitute a rather heterogenous assembly. The inflorescences

are according to KOSTERMANS (1954) at the nodes of the branches and at the trunk. The flowers are uniform. The pods \pm flattened, coriaceous, rigid, curved at the ventral suture and there dehiscent. In *A. jiringa* and *A. fagifolium*, the inflorescences may be both axillary in the upper leaf axils or they may be cauliflorous. The lobed pod is only found in *A. jiringa*, which has big, flat seeds without pleurogram. *A. fagifolium* (*Z. fagifolia*) has pods reddish inside and seeds as in *Pithecellobium* sect. *Clypearia* Benth. The remaining species, *Z. ramiflora* (Australia), *Z. apoense* and *Z. caulostachya* from the Philippines are not yet known in pod. Moreover *Z. apoense* is diœcious and has 2 ovaries per ♀ flower. Impossible to distinguish from *Archidendron*.

DISTRIBUTION OF THE S.-E. ASIAN REPRESENTATIVES

In table 2 the following distribution types can be recognized:

1. Subtropical to tropical Asian species: *A. clypearia*, only indigenous species occurring all over the region.
2. Malayan-Indonesian species: *A. contortum*, *A. bubalinum*, *A. microcarpum*, *A. kuensteri*, *A. globosum*, *A. ellipticum*, *A. jiringa*. Malesia has ca. 70 species of *Archidendron*; only *A. bubalinum*, *A. contortum*, *A. ellipticum* and *A. jiringa* reach as far north as Thailand, and only *A. jiringa* and *A. globosum* reach Burma.
3. Indian-Ceylonese species: *A. monadelphum*, reaches the mountains of N. Burma.
4. Chinese-Indo-Chinese species: *A. lucidum*, *A. utile*, *A. chevalieri*, *A. kerrii*, *A. lucidum* reach the mountains of N.-E. & C. Thailand.
5. Chinese species: *A. yunnanense*, *A. turgidum*. *A. turgidum* reaches N. Vietnam.
6. Indo-Chinese species: *A. pellitum*, *A. bauchei*, *A. occultatum*, *A. poilanei*, *A. robinsonii*, *A. chevalieri*, *A. balansæ*.
7. Species with a rather restricted distribution. *A. glomeriflorum* and *A. conspicuum* (Burma and adjacent Thailand); *A. eberhardtii* and *A. tonkinense* (N. Vietnam); *A. laoticum* (Laos); *A. dalatense* (S. Vietnam); *A. quocense* (S.-E. Thailand, Cambodia, S. Vietnam); *A. pahangense* (Malay Peninsula). Many of the species of this group have only been collected a few times. Future collections in this undercollected area will show if they are as strictly endemic as the present collections might indicate.

Generally it can be said the richest speciation has taken place in the Annamese Cordillera and adjacent areas of Indo-China. The group with the cylindric pods and seeds with sclerotesta all belong in this region but also some species with birds' dispersal are restricted to this area: *A. pellitum*, *A. bauchei* and *A. tetraphyllum*.

TABLE 2: DISTRIBUTION OF THE S.E. ASIAN ARCHIDENDRON SPECIES

SPECIES	India	Burma	Thailand	Cambodia	Laos	S. Vietnam	N. Vietnam	China	Malay Peninsula	Malasia
1. <i>A. clypearia</i>	+	+	+	+	+	+	+	+	+	+
2. <i>A. contortum</i>			++						++	++
3. <i>A. bubalinum</i>			+						+	+
4. <i>A. microcarpum</i>									+	+
5. <i>A. kuensteri</i>									+	+
6. <i>A. globosum</i>		+								+
7. <i>A. pellitum</i>					+	+				
8. <i>A. lucidum</i>			+	+		+	+	+		
9. <i>A. bauchei</i>						+	+			
10. <i>A. glomeriflorum</i>		+	+							
11. <i>A. utile</i>						+	+	+		
12. <i>A. occultatum</i>				+		+				
13. <i>A. ellipticum</i>			+						+	+
14. <i>A. monadelphum</i>	+	+								
15. <i>A. pahangense</i>									+	
16. <i>A. tetraphyllum</i>							+			
17. <i>A. balansæ</i>						+	+			
18. <i>A. poilanei</i>						+	+			
19. <i>A. dalatense</i>						+	+			
20. <i>A. tonkinense</i>						+	+			
21. <i>A. robinsonii</i>						+	+			
22. <i>A. laoticum</i>					+					
23. <i>A. chevalieri</i>						+	+	+		
24. <i>A. conspicuum</i>		+	+							
25. <i>A. kerrii</i>					+			+		
26. <i>A. yunnanense</i>								+		
27. <i>A. eberhardtii</i>							+			
28. <i>A. sp. in obs.</i>						+				
29. <i>A. quocense</i>			+	+		+				
30. <i>A. jiringa</i>		+	+						+	+
31. <i>A. turgidum</i>							+	+		
Total		6	9	4	4	12	12	7	9	

ARCHIDENDRON F.v. Mueller

- Fragm. Phyt. 5: 59 (1865); DE WIT, Bull. Jard. Bot. Buitenzorg 3, 17: 256 (1942); Reinwardtia 2: 71 (1952); type: *A. vaillantii* (F. V. MUELLER) F. V. MUELLER.
 — *Pithecellobium* sect. *Archidendron* (F. V. MUELLER) MOHLENBROCK, Reinwardtia 6: 446 (1963); Webbia 21: 656 (1966).
 — *Pithecellobium* sect. *Clypearia* BENTHAM, London J. Bot. 3: 206 (1844); Trans. Linn. Soc. London 30: 570 (1875) p.p.; MOHLENBROCK, Reinwardtia 6: 446 (1963); type: *P. clypearia* (JACK) BENTHAM.

- *Cylindrokechapha* KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 20 (1954); MOHLENBROCK, Reinwardtia 6: 439 (1963); type: *C. bubalina* (JACK) KOSTERMANS.
- *Paralibizzia* KOSTERMANS, l.c.: 23; type: *P. turgida* (MERR.) KOSTERMANS.
- *Abarema sensu* KOSTERMANS, l.c.: 31, p.p., non PYTTIER (1927).
- *Zygia sensu* KOSTERMANS, l.c.: 23, non BOEHMER (1760).

Unarmed trees or shrubs with usually inconspicuous, caduous stipules. Leaves bipinnate most often with glands on petiole, rachis and pinnæ, not sensitive; leaflets opposite (at least the terminal ones).

Inflorescences terminal or axillary, sometimes cauliflorous or placed at the old branches; flowers collected in heads, umbels, corymbs or racemes, the heads may be arranged in panicles. Flowers uniform ♂ or ♀; calyx gamosepalous, valvate, 5-toothed; corolla gamopetalous, valvate, 5-lobed; stamens numerous, the filaments united into a tube, ovary 1-∞, stalked or sessile, glabrous or puberulous.

Pod flat to terete, straight to spirally twisted, ± dehiscent. Seeds without pleurogram and aril (CORNER, 1976, reports a vestigial aril in *Archidendron solomonense*), the testa an exotesta of varying thickness.

A genus of about 100 species distributed from India to New Guinea and N. Australia.

KEY TO THE SPECIES: FLOWERING SPECIMENS

1. Branchlets angulate to winged.
 2. Flowers stalked; ovary densely sericeous to puberulous 1. *A. clypearia*
 - 2a. Corolla 4-8 mm long..... 1a. ssp. *clypearia*
 - 2b. Corolla 10-11 mm long 1b. ssp. *sessiliflora*
 - 2'. Flowers sessile; ovary glabrous.
 3. Branchlets winged; glands urceolate; corolla 11-12 mm long, finely sericeous 27. *A. eberhardtii*
 - 3'. Branchlets unwinged, glands flat; corolla 8-11 mm long, glabrous 16. *A. tetraphyllum*
- 1'. Branchlets terete.
 4. Flowers pedicellate.
 5. Calyx subrotate; ovary puberulous 4. *A. microcarpum*
 - 5'. Calyx campanulate to broadly funnel-shaped; ovary glabrous 3. *A. bubalinum*
 - 4'. Flowers sessile.
 6. Ovary sessile.
 7. Leaflets sessile; 25-30 flowers per head 12. *A. occultatum*
 - 7'. Leaflets petiolulate; ca. 20 flowers per head 31. *A. turgidum*
 - 6'. Ovary stipitate.
 8. Ovary puberulous.
 9. Calyx 5-7 mm long, corolla 13-15 mm long..... 5. *A. kuenstleri*
 - 9'. Calyx up to 4 mm long; corolla 4-ca. 6 mm long.
 10. 20-25 flowers per head; corolla ca. 6 mm long.. 7. *A. pellitum*
 - 10'. ca. 10 flowers per head; corolla 4-5 mm long 14. *A. monadelphum*
 - 8'. Ovary glabrous.
 11. Staminal tube shorter than the corolla tube.
 12. Calyx tube glabrous.
 13. Leaflets broadly ovate to ovate-elliptic; rachis

- gland sessile, concave, panicles up to 25 cm long up to ca. 10 flowers per head ... 9. *A. bauchei*
- 13'. Leaflets narrowly elliptic to lanceolate; rachis gland slightly raised, convex; panicle up to 7-8 cm long; 20-25 flowers per head 26. *A. yunnanense*
- 12'. Calyx tube puberulous to tomentose.
14. Calyx 4-5 mm long 6. *A. globosum*
- 14'. Calyx up to 3 mm long.
15. Rachis gland urceolate, hollow .. 20. *A. tonkinense*
- 15'. Rachis gland flat to slightly concave.
16. Stipe of ovary longer than the calyx, 3.5-4 mm long; 3 pairs of pinnae per leaf 11. *A. utile*
- 16'. Stipe of ovary shorter than the calyx, ca. 1 mm long; 1-2 pairs of pinnae per leaf 8. *A. lucidum*
- 11'. Staminal tube as long as the corolla tube.
17. Distal leaves with only 1 pair of leaflets per pinna.
18. 10-15 flowers per head; calyx urceolate to cup-shaped.. 25. *A. kerrii*
- 18'. 3-4 flowers per head; calyx obconical..... 16. *A. tetraphyllum*
- 17'. Distal leaves with more than 1 pair of leaflets per pinna.
19. Corolla (9-)12.5-15 mm long 21. *A. robinsonii*
- 19'. Corolla up to 8 mm long.
20. Corolla tube glabrous.
21. Leaves with ca. 5 pairs of pinnae, each with 15-20 pairs of leaflets 2. *A. contortum*
- 21'. Leaves with 1-2 pairs of pinnae, each with 2-4 pairs of leaflets.
22. Rachis gland hollow, urceolate or crater-shaped.
23. Rachis gland big, ca. 8 mm in diam., and 3 mm high, crater-shaped, ca. 25-30 flowers per head 24. *A. conspicuum*
- 23'. Rachis gland smaller, 0.5-3 mm in diam., up to 1 mm high, urceolate; up to 20 flowers per head.
24. Corolla (4.5-)7-8 mm long, lobes glabrous; primary lateral veins of leaflets connected by secondary ones forming a "melastomataceous" pattern of venation 23. *A. chevalieri*
- 24'. Corolla 4.5-5.5 mm long, lobes puberulous; primary lateral veins of leaflets not connected directly by secondary ones 22. *A. laoticum*
- 22'. Rachis gland(s) sessile, cushion-shaped, flat or slightly concave.
25. Both leaflet surfaces pinnately veined, the primary and secondary lateral veins do not form a dense reticulated pattern.
26. Calyx faintly puberulous; corolla 4-5 mm long; peduncles ca. 0.3 cm long 30. *A. jiringa*
- 26'. Calyx glabrous; corolla 6-8 mm long; peduncles up to 5 cm long.... 25. *A. kerrii*
- 25'. Lower leaflet surface with primary and secondary lateral veins forming a dense reticulated pattern.
27. Calyx 1.5-2 mm long; both leaflet surfaces with conspicuous venation. 29. *A. quocense*

- 27'. Calyx 3 mm long; upper leaflet surface with inconspicuous venation... 19. *A. dalatense*
- 20'. Corolla tube puberulous to woolly.
28. 2-6 flowers per head.
29. Pinnae with 3-4 mm long, obtriangular, flat glands between the petiolules; corolla tube sericeous..... 13. *A. ellipticum*
- 29'. Pinnae with 0.5-1 mm diam., subglobose to circular and flat glands; corolla tube puberulous 3. *A. bubalinum*
- 28'. 10 or more flowers per head.
30. Inflorescence densely rusty tomentose, with rachis up to 30 cm long 17. *A. balanse*
- 30'. Inflorescence faintly puberulous to sericeous with rachis up to 10 cm long.
31. Flowers small, corolla up to 4 mm long; lower surface of leaflets puberulous 10. *A. glomeriflorum*
- 31'. Flowers larger, corolla 5-7.5 mm long; leaflets glabrous on both surfaces.
32. Lower leaflet-surface with primary and secondary lateral veins forming a dense reticulated pattern; calyx up to 3.5 mm long.
33. Flowering peduncles up to 1.5 cm long; 10-15 flowers per head; leaflets with dense reticulation on upper surface... 15. *A. pahangense*
- 33'. Flowering peduncles 1-4 cm long; 20-25 flowers per head; leaflets with inconspicuous venation on upper surface... 18. *A. poilanei*
- 32'. Lower leaflet-surface without reticulated venation pattern; calyx 4 mm long..... 26. *A. yunnanense*

KEY TO THE SPECIES: FRUITING SPECIMENS

1. Pods orange or red inside.
2. Seeds with a bluish-black testa.
3. Pods hairy.
4. Branchlets terete.
5. Pods yellowish-tomentose outside, seeds cylindrical 20 mm long, 10 mm in diameter 7. *A. pellitum*
- 5'. Pods finely puberulous outside.
6. Seeds occupying the entire cavity of the pod; central seeds disc-like 3. *A. bubalinum*
- 6'. Seeds do not occupy the entire cavity of the pod; seeds ellipsoid to subglobose.
7. 2-3 pairs of leaflets per pinna 14. *A. monadelphum*
- 7'. 15-20 pairs of leaflets per pinna 2. *A. contortum*
- 4'. Branchlets angulate 1. *A. clypearia*
- 3'. Pod glabrous.
8. Branchlets angulate 16. *A. tetraphyllum*
- 8'. Branchlets terete.
9. Pod cylindric, turgid; seeds occupying the entire cavity; central seeds disc-like 3. *A. bubalinum*
- 9'. Pod flat, not turgid, seeds do not occupy the entire cavity, ovoid to globose.
10. Two kinds of pods in the inflorescence, marginal ones smaller sterile, central ones larger fertile... 4. *A. microcarpum*
- 10'. Only one kind of pods.
11. Primary and secondary lateral veins of leaflets forming a dense reticulation.

12. Leaf-rachis short, 0.5-1(-2) cm long with two glands; pods falcate or contorted in a wide semicircle, valves with prominulous reticulated venation, especially over the seeds. 29. *A. quocense*
- 12'. Leaf-rachis longer, 1-3 cm long, with 1 gland only; pods with contorted valves with inconspicuous venation.
13. Rachis gland elliptical, sunken, suburceolate, up to ca. 5 mm long .. 15. *A. pahangense*
- 13'. Rachis gland circular, flat, substipitate, 1-2 mm in diam. 14. *A. monadelphum*
- 11'. Primary and secondary lateral veins of leaflets do not form a dense reticulation.
14. Seeds large, over 10 × 17 mm; pods large 1-3.5 cm broad and 15-35 cm long.
15. Seeds reniforme to suborbicular, funicle 12-15 mm long 16. *A. tetraphyllum*
- 15'. Seeds ellipsoid, funicle ca. 10 mm long.
16. Glands on pinnae circular ca. 1.5 mm diam. 6. *A. globosum*
- 16'. Glands on pinnae obtriangular 3-4 mm long 12. *A. ellipticum*
- 14'. Seeds smaller, up to 8 × 15 mm, pods smaller up to 1.8 cm broad and ca. 10 cm long.
17. 1 gland on the leaf-rachis 9. *A. bauchetii*
- 17'. 2 or more glands on the leaf-rachis.
18. Fully developed leaves with 3 pairs of pinnae 11. *A. utile*
- 18'. Fully developed leaves with up to 2 pairs of pinnae.
19. Rachis glands oblong-elliptical up to 5 mm long ... 5. *A. kuenstleri*
- 19'. Rachis glands circular up to 1 mm in diam.
20. Proximal leaflets alternate; upper leaflet-surface dark when dry.... 8. *A. lucidum*
- 20'. Proximal leaflets opposite; upper leaflet-surface dull-green when dry .. 10. *A. glomeriflorum*
- 2'. Seeds with a thin yellowish or brownish testa.
21. Branchlets blackish when dry; pods greyish outside.... 29. *A. quocense*
- 21'. Branchlets reddish when dry; pod brownish outside.... 31. *A. turgidum*
- 1'. Pods greyish or brownish inside.
22. Pod contorted, deeply constricted between the seeds..... 30. *A. jiringa*
- 22'. Pod straight, turgid to slightly compressed.
23. Branchlets angulate, winged 27. *A. eberhardtii*
- 23'. Branchlets terete, unwinged.
24. Pods small, turgid to slightly compressed 1.5-2 cm diam.
25. Pods cylindrical ca. 2 cm diam., central seeds circular 13 mm diam. 25. *A. kerrii*
- 25'. Pods somewhat compressed, 1.5 cm diam., central seeds elliptical in cross-section, ca. 6 mm × 1.6 mm 28. *A. sp. in obs.*
- 24'. Pods 2.5 cm or more in diam.
26. Pods with woody, pale whitish valves with red spots 17. *A. balansæ*

- 26'. Pods with coriaceous, blackish to brownish valves.
28. Primary lateral veins of leaflets connected by parallel secondary veins 23. *A. chevalieri*
28'. Primary lateral veins of leaflets not connected by parallel secondary veins 20. *A. tonkinense*
27. Rachis gland raised urceolate.
27'. Rachis-gland sessile, flat to sunken.
29. Upper surface of leaflets with prominulous venation; secondary lateral veins not forming a reticulated pattern; glands flat 21. *A. robinsonii*
29'. Upper surface of leaflets with inconspicuous venation: lower with prominent primary and secondary lateral veins forming a reticulated pattern; glands flat to sunken 18. *A. poilanei*

PODS UNKNOWN: 12. *A. occultatum*, 19. *A. dalatense*, 22. *A. laoticum*, 24. *A. conspiciuum*, 26. *A. yunnanense*.

ENUMERATION OF THE SPECIES

(Phylogenetic sequence)

1. *Archidendron clypearia* (Jack) I. Nielsen, *comb. nov.*

ssp. *clypearia*

- *Inga clypearia* JACK, Malayan Misc. 2(7): 78 (1822); neotype: *Wallich 5270A*, *excl. fruct.*, Penang, K.
- *Pithecellobium clypearia* (JACK) BENTHAM, London J. Bot. 3: 209 (1844).
- *Abarema clypearia* (JACK) KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20:42 (1954), *excl. syn. Mimosa nodosa* LOUREIRO non L.
- *Pithecolobium subcoriaceum* THWAITES, Enum. Pl. Zeyl.: 100 (1859); type: *Thwaites 337*, Ceylon (holo-, K).
- *Abarema subcoriacea* (THWAITES) KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 41 (1954).

Tropical-subtropical Asia (India-New Guinea), alt.: sea level-1700 m.

ssp. *sessiliflorum* (Merrill) I. Nielsen, *comb. et stat. nov.*

- *Pithecellobium sessiliflorum* MERRILL, Philipp. J. Sci. (Bot.) 17: 262 (1920); type: *Ramos & Pascasio 34675*, Philippines (holo-, A; iso-, K).
- *Pithecellobium cuneadenum* KOSTERMANS, Reinwardtia 3: 9 (1954); type: *Guard & Kalong, Forest Dept. 22418*, Malaysia, Pahang (holo-, SING; iso-, K).
- *Abarema cuneadena* (KOSTERMANS) KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 35 (1954).

S. Thailand, Malaya, The Philippines.

KOSTERMANS (1954 b: 42) states that the type of *Inga clypearia* Jack comes from Bencoolen, Sumatra. There is no herbarium of William JACK,

the types of his species have either been destroyed or distributed to various herbaria, and are thus difficult to localize. It has not been possible to localize it in A, BM, BR, E, K, L, P, and U, and it probably does not exist. BENTHAM (1844: 209) mentioned "Wall. Cat. n° 5270 A and B" as type of *Inga clypearia* Jack and thus of his *Pithecellobium clypearia*. In the case of both A and B the fruit of the type must be excluded. The pod attached to *Wallich 5270 A* from Penang belongs to *A. jiringa* and that from *Wallich 5270 B* from Singapore to *A. ellipticum*. But the branchlets, leaflets and flowers of *Wallich 5270 A* are in perfect accordance with the description of BENTHAM and can thus be chosen as neotype of *P. clypearia* Benth.

A. clypearia is an extremely variable species which, however, always can be recognized by its angulate branchlets, pedicellate flowers and hairy, stipitate ovary. There is a great variation in the size, number and indumentum of leaflets and in the size of the flowers.

P. subcoriaceum was retained as a species by KOSTERMANS (1954) but it has a puberulous ovary and not as stated by KOSTERMANS a glabrous one, and is therefore included here.

The large-flowered form with flowers more than 10 mm long was first described as *Pithecellobium sessiliflorum* by MERRILL (*l.c.*) from the Philippines. The flowers of the type are not as the name might indicate sessile, but stalked. KOSTERMANS (1954a) described a corresponding specimen from Frazer's Hill, Malaysia as *Pithecellobium cuneadenum* Kosterm. As only the flower size is different from the main subspecies I have reduced the two species mentioned above to subspecific rank under *A. clypearia*.

2. *Archidendron contortum* (Martius) I. Nielsen, *comb. nov.*

- *Pithecellobium contortum* MARTIUS, Flora 20, 2. Beibl.: 115 (1837); type: *Wallich 5283 A*, Malaysia, Penang (holo-, K).
- *Abarema contorta* (MARTIUS) KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 49 (1954).

S. Thailand, Malay Peninsula, Sumatra, Borneo.

This species can easily be recognized by its inflorescence which has slender branches and 2-3 flowered nearly sessile to sessile heads (= clusters of flowers). It was stated by KOSTERMANS (*l.c.*) that the ovary is puberulous. I have found glabrous ovaries only.

3. *Archidendron bubalinum* (Jack) I. Nielsen, *comb. nov.*

- *Inga bubalina* JACK, Malayan Misc. 2: 771 (1822); neotype: *Maingay 576*, Malacca, K (= 1549A: leaves and flowers); paratype: *Maingay 576* (= 1549: pod), K.
- *Pithecellobium bigeminum* (L.) MARTIUS var. *bubalinum* (JACK) BENTHAM, London J. Bot. 3: 207 (1844), *p.p.*, *excl. Wallich 5272*, Penang.
- *Pithecellobium bubalinum* (JACK) BENTHAM, Trans. Linn. Soc. 30: 576 (1875).

- *Cylindrokelupha bubalina* (JACK) KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 20 (1954), p.p., excl. syn. *Albizia bubalina* KURZ.
- *Ortholobium bubalinum* (JACK) KOSTERMANS, Commun. Forest Res. Inst. 54: 7 (1956), comb. inval.

S. Thailand, Malay Peninsula, Sumatra, alt. ca. 150-600 m.

KOSTERMANS (*l.c.*) mentions *Jack s.n.*, Bencoolen, Sumatra as type. As noted under *A. clypearia* a herbarium of William JACK does not exist, and the type of *Inga bubalina* JACK has been looked for in vain in BM, E, K, L, P, U. BENTHAM (1844) based his *P. bigeminum* var. *bubalinum* on "Wallich Cat. n° 5272" from Penang, which is *A. microcarpum*. He also combined *Inga bubalina* JACK under that variety except for the fruit which he believed belonged to a *Cassia* near *C. fistula*. BENTHAM (1875) mentions 3 collections under his *Pithecolobium bubalinum*: *Griffith 1949*, *Maingay 576* (= 1549A, 1549) from Malacca and the *Wallich* plant mentioned above from Penang. BENTHAM now accepts and describes the pod as William JACK (*l.c.*) did. Both the *Griffith* and the *Maingay* collection bear the name "*Pithecolobium bubalinum*" in the handwriting of BENTHAM and could both be chosen as neotype. However, *Maingay 576* (= 1549A: flower and leaves, type!, 1549: pod, paratype) is the most perfect of the specimens.

Pithecellobium bubalinum Benth. was misinterpreted by KURZ (J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 45: 129, 1876), who referred it under his *Albizia bubalina* together with the specimens *Novara 242*, and *Jelinek 133* (= *P. monadelphum* Kosterm.) from the Nicobar Islands.

4. *Archidendron microcarpum* (Bentham) I. Nielsen, *comb. nov.*

- *Pithecellobium microcarpum* BENTHAM, Trans. Linn. Soc. London 30: 576 (1875); type: *Griffith 1947*, Malacca (holo-, K; iso-, GH).
- *Abarema microcarpa* (BENTHAM) KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 67 (1954).

Malay Peninsula, Sumatra and Borneo; alt. sea level-300 m.

The flowers of this species are not sessile as stated by KOSTERMANS (*l.c.*), but shortly pedicellate.

5. *Archidendron kuenstleri* (Prain) I. Nielsen, *comb. nov.*

- *Pithecolobium kuenstleri* PRAIN, in KING, J. Asiat. Soc. Beng. 66 (2): 271 & 517 (1897); type: *Künstler 7875*, Malaya, Perak (holo-, K).
- *Abarema kuenstleri* (PRAIN) KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 57 (1954).

Malay Peninsula, Sumatra, Borneo; alt. about sea level.

6. *Archidendron globosum* (Blume) I. Nielsen, *comb. nov.*

- *Inga globosa* BLUME, Cat. Gewassen's Lands. Pl. Tuin Buitenzorg 38: 88 (1823); type: *Blume s.n.*, Java, Mt. Salak (holo-, BO; iso-, L).
- *Aborema globosa* (BLUME) KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 36 (1954).
- *Aborema kiahii* KOSTERMANS, Commun. Forest Res. Inst. 54: 5 (1956); type: *Sinclair & Kiah bin Salleh SFN 40940*, Malaya, Trengganu (holo-, BO; iso-, E, K, SING).

Assam? (acc. to KOSTERMANS, *l.c.*), Burma, Malay Peninsula, Sumatra, Java, alt. sea level-150 m.

The type of *Aborema kiahii* Kostermans was described in fruit only, but it falls within the variation of *A. globosum*, having similar glands, leaflets and pods.

7. *Archidendron pellitum* (Gagnepain) I. Nielsen, *comb. nov.*

- *Pithecellobium pellitum* GAGNEPAIN, Bull. Soc. Bot. Fr. 44: 50 (1952); type: *Poilane 22185*, S. Vietnam, Lam Dong, Blao (holo-, P).
- *Aborema pellita* (GAGNEPAIN) KOSTERMANS, Commun. Forest Res. Inst. 54: 3 (1956).
- *Aborema globosa* auct. non KOSTERMANS, KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 36 (1954), *p.p.* for the Indo-Chinese specimens.

Laos, S. Vietnam; alt. 500-800 m. (Fig. 1, 1).

KOSTERMANS (1956) choose *Poilane 23185* as type. This must be a printer's error as the type annotated by KOSTERMANS bears the number

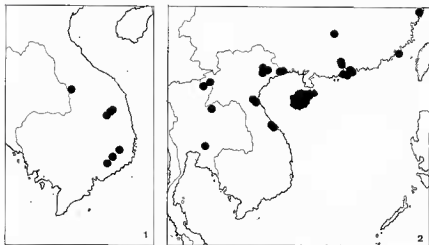


Fig. 1. — Distribution of *Archidendron*: 1, *A. pellitum* (Gagnepain) I. Nielsen ●; 2, *A. lucidum* (Benth.) I. Nielsen ●.

22185. I have not been able to confirm the distribution of this species given by KOSTERMANS (1956) to Burma and Assam. It is probably endemic to the Central Highland of S. Vietnam and adjacent Laos.

8. *Archidendron lucidum* (Benth) I. Nielsen, *comb. nov.*

- *Pithecolobium lucidum* BENTHAM, London J. Bot. 3: 207 (1844); type: *Beechey s.n.*, China, near Macao (holo-, K).
- *Abarema lucida* (BENTHAM) KOSTERMANS, Bull. Organ. Natuurw. Onders. Indonesië 20: 38 (1954).

Taiwan, China, Thailand, Cambodia, Laos, Vietnam; alt. sea level-ca. 1300 m. (Fig. 1, 2).

9. *Archidendron bauchei* (Gagnepain) I. Nielsen, *comb. nov.*

- *Pithecellobium bauchei* GAGNEPAIN, Not. Syst. Paris 2: 118 (1911); type: *Bauche 104*, S. Vietnam, Hué (holo-, P).
- *Abarema bauchei* (GAGNEPAIN) KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 36 (1954); *Adansonia*, ser. 2, 6: 354 (1966).
- *Mimosa nodosa* auct. non L.: LOUREIRO, Fl. Cochinch.: 649 (1790); ed. WILLD.: 798 (1793).
- *Pithecellobium clypearia* var. *acuminatum* auct. non GAGNEPAIN: MOORE, J. Bot. 63: 290 (1925); MERRILL, Trans. Amer. Philos. Soc. 24: 185 (1935).
- *Abarema clypearia* auct. non (JACK) KOSTERMANS: KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 42 (1954).

Vietnam; alt. sea level. (Fig. 2, 3).

Mimosa nodosa Loureiro (*non* L.) was wrongly put as a synonym under *P. clypearia* by MOORE, MERRILL and KOSTERMANS (*l.c.*). LOUREIRO in his *Flora Cochinchinensis* misinterpreted the Linnean species from Ceylon based on PLUKENET: *Phaseolus arboreus tetraphyllus Zeylanicus*, (PLUKENET's *Phytographia* 3: *tab. 211, fig. 5*, 1692). The PLUKENET plant was studied in the Sloane Herbarium, British Museum, Natural History, n° R.S. 438.43. It is a sterile plant and certainly not Mimosaceae but belongs somewhere in the tribe *Phaseoleae* in the *Papilionaceae*, being a climber and having only once pinnate leaves.

KOSTERMANS (1966) has proposed that this species might after all represent a variety of *Pithecellobium lucidum*. It is, however, quite different from that species with the leaves having only 1 gland on the rachis, leaflets opposite and broader, calyx glabrous and with bigger corolla.

10. *Archidendron glomeriflorum* (Kurz) I. Nielsen, *comb. nov.*

- *Albizia glomeriflora* KURZ, J. Asiat. Soc. Beng. 42 (2): 74 (1873); type: *Kurz 1755*, Burma (holo-, K).

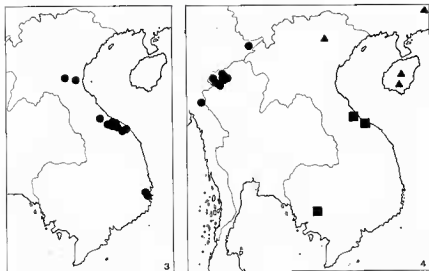


Fig. 2. — Distribution of *Archidendron*: 3, *A. bauchei* (Gagnepain) I. Nielsen ●; 4, *A. glomeriflorum* (Kurz) I. Nielsen ●, *A. occultatum* (Gagnepain) I. Nielsen ■, *A. utile* (Chun & How) I. Nielsen ▲.

— *Abarema glomeriflora* (KURZ) KOSTERMANS, Bull. Organ, Natuurw. Onderz. Indonesië 20: 61 (1954).

N. Thailand, Burma (Shan States), alt. 600-1800 m. (Fig. 2, 4).

11. *Archidendron utile* (Chun & How) I. Nielsen, *comb. nov.*

— *Pithecellobium utile* CHUN & HOW, Acta Phytotax. Sin. 7: 17, fig. 5 (1958); type: How 72067, China, Hainan (holo-, IBSC; iso-, A).

— *Abarema utilis* (CHUN & HOW) KOSTERMANS, Adansonia, ser. 2, 6: 359 (1966).

S. China, N. Vietnam; alt. 400-700 m. (Fig. 2, 4).

This species is very close to *A. glomeriflorum*. The main differences are as follow:

<i>A. glomeriflorum</i>	<i>A. utile</i>
Pinnae 1-2 pairs	Pinnae 3 pairs
Calyx ca. 1.3 mm long	Calyx 1.5-3 mm long
Corolla ca. 4 mm long	Corolla 5.5-8 mm long
Staminal tube as long as corolla tube	Staminal tube shorter than corolla tube

Further material may show a cline between the two species. The Hainan material has the longest flowers, ca. 8 mm long, whereas the Kwangtung specimen has the shortest ones, ca. 5.5 mm long; *A. glomeriflorum* has flowers ca. 4 mm long, but they are still different in the length of the staminal tube.

12. *Archidendron occultatum* (Gagnepain) I. Nielsen, *comb. nov.*

- *Pithecolobium occultatum* GAGNEPAIN, Bull. Soc. Bot. Fr. 99: 50 (1952); type: *Poilane 10979*, S. Vietnam (holo-, P).
- *Abarema occultata* (GAGNEPAIN) KOSTERMANS, Commun. Forest Res. Inst. 54: 3 (1956).

S. Vietnam, Cambodia; alt. up to 1200 m. (Fig. 2, 4).

In habit very close to *A. glomeriflorum* and *A. utile*, but differs by the indumentum, the number of flowers per head and the sessile ovary.

This species is not as stated by KOSTERMANS (*l.c.*) closely related to *Pithecolobium sessiliflorum* Merr., which is here treated under *A. clypearia* and has stipitate flowers ca. 10 mm long and stipitate, sericeous ovary.

13. *Archidendron ellipticum* (Blume) I. Nielsen, *comb. nov.*

- *Inga elliptica* BLUME, Catal. Gewassen's Lands Pl. Tuin Buitenzorg 38: 88 (1823); type: *Blume s.n.*, Java, Gunong Parang (holo-, BO).
- *Abarema elliptica* (BLUME) KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 53 (1954).

Thailand, Malaya, Sumatra, Borneo, Java and the Philippines; alt sea level-300 m.

KOSTERMANS (*l.c.*) stated that the calyx is 4-5 mm long and the corolla ca. 8 mm long. The material I have studied has calyx 1.5-2 mm long and corolla 4.5-5 mm long.

14. *Archidendron monadelphum* (Roxburgh) I. Nielsen, *comb. nov.*

- *Mimosa monadelpha* ROXBURGH, Fl. Ind. 2: 544 (1832); type: *Roxburgh s.n.* (holo-, BR).
- *Abarema monadelpha* (ROXBURGH) KOSTERMANS, *emend.* KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 50 (1954).
- *Pithecolobium nicobaricum* PRAIN, in KING, J. Asiat. Soc. Beng. 66 (2): 267 (1897); type: *King's collector (Jelneck) s.n.*, S. Andaman, Teressa Isl. (holo-, K).
- *Abarema bigemina* (MARTIUS) KOSTERMANS, *l.c.*: 51, *p.p.*, *quoad cit. syn. P. nicobaricum* PRAIN.

India, Ceylon?, Nicobar Isl.?, Nepal, Sikkim, Burma; alt. up to ca. 2000 m.

I have only hesitatingly included *P. nicobaricum* Prain under this species. It was combined with *Abarema bigemina* by KOSTERMANS (*l.c.*). It is not known in flower. Because of its rachis glands, the reticulation of the leaflets and the narrow pod it has more in common with *P. monadelphum* than with *P. bigeminum*.

15. *Archidendron pahangense* (Kostermans) I. Nielsen, *comb. nov.*

— *Pithecellobium pahangense* KOSTERMANS, *Reinwardtia* 3: 16 (1954); type: *Nur 11025*, Malaya, Frazer's Hill (holo-, SING).

— *Abarema pahangensis* (KOSTERMANS) KOSTERMANS, *Bull. Organ. Natuurw. Onderz. Indonesië* 20: 57 (1954).

Inflorescences terminal and axillary small panicles up to 8-10 cm long, puberulous; sec. branches ca. 2-3 cm long. Peduncles 1-1.5 cm long, either on the primary, sec. branches or the axis, often 2 together, bearing heads of 10-15 sessile flowers.

Flowers: Calyx 2-2.3 mm long, campanulate, densely puberulous to sericeous with 0.3-0.5 mm long triangular to deltoid teeth. Corolla 5-5.5 mm long, narrowly campanulate, densely puberulous to sericeous with 3 mm long, lanceolate, acute lobes. Staminal tube as long as the corolla tube. Ovary 1.5-2 mm long, glabrous, stipitate, stipe ca. 2.5 mm long.

Malay Peninsula (Genting Highlands); alt. 1000-1500 m.

The species is only known around the type locality on Frazer's Hill. It was described in fruit only by KOSTERMANS (*l.c.*), and the flowers are described here in full for the first time.

16. *Archidendron tetraphyllum* (Gagnepain) I. Nielsen, *comb. nov.*

— *Pithecellobium tetraphyllum* GAGNEPAIN, *Bull. Soc. Bot. Fr.* 99: 50 (1952); type: *Eberhardt 4250*, N. Vietnam, Hoa Binh (holo-, P; iso-, K).

— *Abarema tetraphylla* (GAGNEPAIN) KOSTERMANS, *Commun. Forest Res. Inst.* 54: 5 (1956).

N. Vietnam; alt. ca. 500 m. (Fig. 3, 5).

The position of this species is rather isolated. It was given the name *P. tetraphyllum* by GAGNEPAIN (*l.c.*), because of the reduced leaves just below the inflorescence, with only 1 pair of leaflets per pinna. The lower leaves may, however, have up to 4 pairs of leaflets per pinna. The species can easily be recognized by the angular young branches, the slender inflorescence and the long and narrow pod with large seeds.

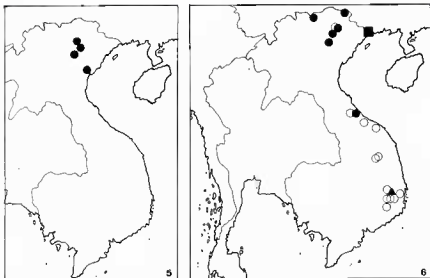


Fig. 3. — Distribution of *Archidendron*: 5, *A. tetraphyllum* (Gagnepain) I. Nielsen ●; 6, *A. balansae* (Oliver) I. Nielsen ●, *A. dalatense* (Kostermans) I. Nielsen ▲, *A. poilanei* (Kostermans) I. Nielsen ○, *A. tonkinense* I. Nielsen ■.

17. *Archidendron balansae* (Oliver) I. Nielsen, *comb. nov.*

- *Pithecolobium balansae* OLIVER, in HOOKER f., *Icon. Pl.* 20: *tab.* 1976 (1891); type: *Balansa* 2299, N. Vietnam, Sontay, Mont Bavi (holo-, K; iso-, P).
- *Cylindrokelupha balansae* (OLIVER) KOSTERMANS, *Bull. Organ. Natuurw. Onderz. Indonesië* 20: 21 (1954), *p.p.*; *Adansonia*, ser. 2, 6: 359 (1966), *quoad specimen Eberhardt 5029*.
- *Cylindrokelupha annamensis* KOSTERMANS, *Reinwardtia* 5: 247 (1960), *p.p.*, *quoad specimen Eberhardt 5029*.

N. Vietnam and N. part of S. Vietnam, alt. 400-1300 m. (Fig. 3, 6)

KOSTERMANS (1966) included his *Cylindrokelupha annamensis* in this species. This is only correct for the paratype of his species, *Eberhardt 5029*, while the type belongs to the following species *A. poilanei*, which was described by him earlier in 1956 as *Abarema poilanei* (see the following species for the main differences!).

18. *Archidendron poilanei* (Kostermans) I. Nielsen, *comb. nov.*

- *Abarema poilanei* KOSTERMANS, *Commun. Forest Res. Inst.* 54: 4 (1956); type: *Poillane 10356*, S. Vietnam (holo-, P; iso-, BM, US).
- *Cylindrokelupha annamensis* KOSTERMANS, *Reinwardtia* 5: 247 (1960), *p.p.*, *excl. Eberhardt 5029*; type: *Poillane 24418*, S. Vietnam (holo-, P).

- *Cylindrokelupha balansæ* auct. non (OLIVER) KOSTERMANS: KOSTERMANS, *Adansonia*, ser. 2, 6: 359 (1966), p.p., excl. Eberhardt 5029.
- *Cylindrokelupha poilanei* auct. non KOSTERMANS: KOSTERMANS, l.c.: 361, quoad specimen Poilane 10356.

Vietnam; alt 1000-1200 m. (Fig. 3, 6).

KOSTERMANS (1960) chose *Poilane 24418* as type of his *Cylindrokelupha annamensis*. In 1966 he mentioned *Poilane 32620* as type. The first choice has to be maintained. In 1966 KOSTERMANS reduced his *Cylindrokelupha annamensis* to synonymy under *C. balansæ*, but the leaf-characters and the pod-characters refer it clearly to his own *Abarema poilanei*. The main differences between the two species are as follows:

<i>A. balansæ</i>	<i>A. poilanei</i>
Inflorescence ca. 30 cm long tomentose	Inflorescence 10 cm long, faintly puberulous
Calyx tomentose to woolly	Calyx faintly puberulous to glabrous
Corolla tomentose to woolly	Corolla sericeous
Pod: 8-40 × ca. 5 cm, woody valves	Pod: 3-15 × 3 cm, coriaceous valves
Seeds red-brown with white spots	Seeds brown

The specimens *Eberhardt 4944, 5002, 5022, 5032* from Tam Dao, Vinh Phuc prov. in N. Vietnam may belong to a different variety. They have rachis glands placed 0-1 cm below the bases of the pinnæ, the glands being circular to elliptical, 1-1.5 mm in diam. flat, sessile to slightly raised. The corolla is 6.5-8 mm long, where the S. Vietnamese specimens have corollas 6-7.5 mm long.

19. *Archidendron dalatense* (Kostermans) I. Nielsen, *comb. nov.*

- *Abarema dalatensis* KOSTERMANS, *Adansonia*, ser. 2, 6: 353 (1966); type: *Chevalier 30019*, S. Vietnam, Tuyen Duc, Long Bian (holo-, P; iso-, A, US).

S. Vietnam; alt. 1400 m. (Fig. 3, 6).

20. *Archidendron tonkinense* I. Nielsen, *sp. nov.*

- *Paralbizzia robinsonii* auct. non KOSTERMANS: KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 23 (1954), quoad specimen *Balansa 1304*.
- *Cylindrokelupha robinsonii* auct. non KOSTERMANS: KOSTERMANS, *Adansonia*, ser. 2, 6: 360 (1966), quoad specimen *Tsang 29040*.

Ab A. chevalieri (Kosterm.) I. Nielsen differt absentia nervationis tertiariæ parallelæ foliolorum, corolla sericea campanulata vel infundibuliformi, non nisi 5.5 mm longa, et tubo staminum quam tuba corollæ brevior.



Pl. 1. — *Archidendron eberhardtii* Nielsen : 1, pinna $\times 1/3$ (Poilane 1650); 2, rachis-gland $\times 2/3$; 3, inflorescence $\times 1/3$; 4, flower $\times 2$; 4', section of flower $\times 2$ (Eberhardt 4081); 5, pod $\times 4/9$; 6, seed $\times 2/3$ (Poilane 1650). — *Archidendron tonkinense* Nielsen : 7, leaf $\times 1/3$; 8, junna-gland $\times 2$; 9, detail of lower leaflet surface showing venation $\times 3$ (Balansa 1304); 10, inflorescence $\times 1/3$; 11, flower $\times 3$; 11', section of flower $\times 4$ (Tsang 29040); 12, pod opened showing seeds $\times 4/9$ (Balansa 1304).

TYPUS : *Tsang 29040*, N. Vietnam (holo-, A; iso-, E, P).

PARATYPUS (legumen): *Balansa 1304*, N. Vietnam (P).

Small tree 5-6 m high (acc. to TSANG). Branchlets terete with brownish bark, minutely lenticellate, glabrous.

Leaves: Rachis up to 2.5 cm long and 1-1.5 mm in diam., glabrous to inconspicuously puberulous; gland between the bases of the pinnæ to 0.5 cm below the bases of the pinnæ, 0.5-1.5 mm long and ca. 1 mm high, substipitate, narrow urceolate, hollow. Pinnæ 1 pair up to 5.5 cm long, often reduced just under the inflorescence, very faintly puberulous to glabrous; gland 0.5 mm below the bases of the petiolules, 0.5 mm diam. and 0.5 mm high, urceolate.

Leaflets 2-3 pairs, opposite to subopposite, petiolulate, petiolule 2 mm long, (1-)2-3 × (2.5)-5.5-9.5 cm, lanceolate, base symmetrically narrowly cuneate; apex obtusely acuminate, chartaceous; upper surface with inconspicuous veins glabrous; lower surface with prominent veins, tertiary and secondary veins forming a reticulated pattern, glabrous.

Inflorescence a terminal branched panicle up to ca. 7 cm long, faintly sericeous, with up to 6-7 cm long secondary branches, bearing the peduncles. Peduncles solitary or paired, ca. 1 cm long, subtended by buds of undeveloped leaves, bearing heads of 12-15 sessile flowers, ca. 1.2 cm in diameter including stamens.

Flowers: Calyx 2 mm long, lower diameter 0.75 mm, upper 1.25 mm, subtubular, faintly adpressed puberulous, with 0.25 mm long deltoid teeth. Corolla 5.5 mm long, campanulate to broadly funnel-shaped, sericeous; lobes 2.1 mm long, narrowly oblong, acute. Staminal tube shorter than the corolla tube, 3 mm long. Ovary glabrous, 1.5 mm long, stipitate, stipe 1.5 mm long.

Pod (*Balansa 1304*, P) 7-8 cm long and 5 cm broad, ovate, glabrous dehiscent along both sutures. Valves brownish with indistinct venation. Seeds 2, sub-turbinate-truncate, 3-4 cm high, the truncate side broadly elliptical to suborbicular in circumscription, 3.5 × 4.5 cm. Sclerotesta brownish. — Pl. 1.

N. Vietnam. (Fig. 3, 6).

21. *Archidendron robinsonii* (Gagnepain) I. Nielsen, *comb. nov.*

- *Pithecellobium robinsonii* GAGNEPAIN, Not. Syst., Paris 2: 281 (1912); type: *Robinson 1454*, S. Vietnam (holo-, P; iso-, K).
- *Paralbizzia robinsonii* (GAGNEPAIN) KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 23 (1954), p.p.
- *Abarema robinsonii* (GAGNEPAIN) KOSTERMANS, Commun. Forest Res. Inst. 54: 8 (1956), p.p.
- *Cylindrokelupha robinsonii* (GAGNEPAIN) KOSTERMANS, Adansonia, ser. 2, 6: 360 (1966), p.p., excl. syn. *Cylindrokelupha chevalierii* KOSTERMANS, *Pithecellobium laoticum* GAGNEPAIN.

- *Cylindrokelupha platyphylla* KOSTERMANS, Reinwardtia 5: 246 (1960), *p.p.*, *quoad specimen Poilane 11161*; type: *Poilane 11161*, S. Vietnam (holo-, P).
- *Cylindrokelupha poilanei* KOSTERMANS, Reinwardtia 5: 246 (1960); *Adansonia*, ser. 2, 6: 361 (1966); type: *Poilane 6338*, S. Vietnam (holo-, P).
- *Cylindrokelupha balansæ* auct. non (OLIVER) KOSTERMANS: KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 22 (1954), *quoad specimen Poilane 6643*.

Vietnam; alt. 400-700 m. (Fig. 4, 7).

This species can be recognized by the recurved lower parts of leaf-scars, and the dimensions of the flowers. KOSTERMANS (1954) cites some Burmese specimens, which have not been at my disposal. The specimen cited from Thailand, *Kerr 3114*, probably belongs to *A. laoticum* but is sterile. The other specimens cited by KOSTERMANS (1954) as belonging to *Paralobizzia robinsonii* belong to *A. robinsonii*, *A. quocense*, *A. dalatense*, *A. laoticum*, *A. chevalieri*, *A. tonkinense* and *A. kerrii*.

In 1966 KOSTERMANS reduced *C. chevalieri* and *P. laoticum* to synonymy under *C. robinsonii*. As can be seen from the keys there are great differences between the three species mentioned, and they are kept separate here.

Ortholobium platyphyllum Gagn. (Bull. Soc. Bot. Fr. 99: 37, 1952, *nom. inval.*) was based on 3 syntypes belonging to three different species: *Poilane 11161* to *A. robinsonii*, *Poilane 1650* to *A. eberhardtii*, *Poilane 16664* to *A. chevalieri*. They were all referred to *C. platyphylla* by KOSTERMANS (1960) and to *C. robinsonii* by the same author in 1966.

Ortholobium umbellatum Gagn. (Bull. Soc. Bot. Fr. 99: 37, 1952, *nom. inval.*) was based on two syntypes *Poilane 5765* and *Poilane 6338*, not 6328 as stated in the protologue and by KOSTERMANS (1960) because of a printer's error. Both collections belong to *A. robinsonii*. One of them, *Poilane 6338*, is the base of *C. poilanei* Kosterm. This is by KOSTERMANS (1966) at the same time included in his *C. robinsonii* and kept as a distinct species!

Under *C. robinsonii*, KOSTERMANS (1966) mentions *Poilane 7845* (= *A. chevalieri*) as well as *Poilane 6338* as type of *Ortholobium umbellatum*. *Poilane 7845* was never cited under that species by GAGNEPAIN but under his *Ortholobium chevalieri* Gagn. (*l. c.*: 38, 1952, *nom. inval.*).

The Burmese specimen, *Rock 1998*, cited by KOSTERMANS (1966), belongs to *A. conspicuum* and other specimens mentioned by KOSTERMANS (*l. c.*) belong under *A. chevalieri*, *A. tonkinense* and *A. laoticum* (see under the respective species for the numbers cited).

Pételot 2180 from N. Vietnam differs from the main variety by having rachis and pinnae glands 3-5 mm long, flat and obovate, the corolla 9-10 mm long, broadly tubular and sericeous all over. It may deserve varietal rank but is enumerated here because of its fragmentary state.

22. *Archidendron laoticum* (Gagnepain) I. Nielsen, *comb. nov.*

- *Pithecellobium laoticum* GAGNEPAIN, Bull. Soc. Bot. Fr. 99: 48 (1952); type: *Dussault 86*, Laos (holo-, P).

- *Paralbizzia robinsonii* auct. non (GAGNEPAIN) KOSTERMANS: KOSTERMANS, Bull. Organ. Natuurw. Onderz. 20: 23 (1954), quoad specimen Poilane 20686.
- *Abarema robinsonii* auct. non (GAGNEPAIN) KOSTERMANS: KOSTERMANS, Commun. Forest Res. Inst. 54: 8 (1956), quoad specimen Dussaud 86.
- *Cylindrokulupha robinsonii* auct. non (GAGNEPAIN) KOSTERMANS: KOSTERMANS, Adansoniana, ser. 2, 6: 366 (1966) quoad specimen Dussaud 86.

Burma?, Thailand?, Laos. (Fig. 4, 7).

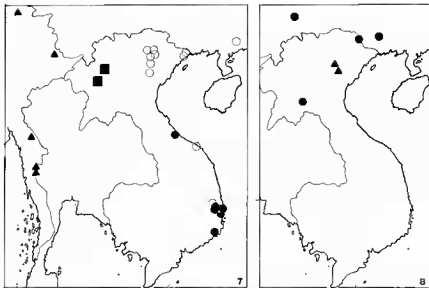


Fig. 4. — Distribution of *Archidendron*: 7, *A. chevalieri* (Kostermans) I. Nielsen ○, *A. conspiciuum* (Craib) I. Nielsen ▲, *A. laoticum* (Gagnepain) I. Nielsen ■, *A. robinsonii* (Gagnepain) I. Nielsen ▲; 8, *A. kerrii* (Gagnepain) I. Nielsen ●, *A. eberhardii* I. Nielsen ▲.

The specimens *Kerr 3114* (E) from Doi Khun Yam, Chiang Mai prov., Thailand, and *Mac Gregor 1296* (E), Shan States, Burma probably belongs here, but cannot be determined with certainty as only very young buds are present.

23. *Archidendron chevalieri* (Kostermans) I. Nielsen, *comb. nov.*

- *Cylindrokulupha chevalieri* KOSTERMANS, Reinwardtia 5: 248 (1960); type: *Chevalier 38636*, S. Vietnam (holo-, P).
- *Paralbizzia robinsonii* auct. non (GAGNEPAIN) KOSTERMANS: KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 23 (1954), quoad specimen Tsang 22476.
- *Cylindrokulupha robinsonii* auct. non (GAGNEPAIN) KOSTERMANS: KOSTERMANS, Adansoniana, ser. 2, 6: 360 (1966), quoad syn. *C. chevalieri* KOSTERMANS et quoad spec. maj. p.

Cylindroclupha platyphylla auct. non KOSTERMANS: KOSTERMANS, Reinwardtia 5: 247 (1960); Adansonia, ser. 2, 6: 360 (1966), p.p., quoad specimen Poilane 16664.

S. China, Vietnam, alt. 150-1300 m. (Fig. 4, 7).

This species is close to *P. laoticum* but can be recognized by the greyish bark, the venation pattern of the leaflets where most of the tertiary veins are parallel and anastomosing, connecting the secondary ones, the glabrous inflorescence and the larger flowers.

Pételot 2176 has flowers only 4.5 mm long, while all the other specimens examined have flowers 7-8 mm long. Because of the leaf and gland characters which are the same as those of the main bulk, it is included here.

The major part of the specimens cited under *Cylindroclupha robinsonii* by KOSTERMANS (1966) belong here.

24. *Archidendron conspicuum* (Craib) I. Nielsen, *comb. nov.*

- *Pithecellobium conspicuum* CRAIB, Kew Bull. (1927): 394; type: *Kerr 10252*, Thailand (holo-, K; iso-, ABD, BM).
- *Abarema quocensis* auct. non (PIERRE) KOSTERMANS: KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 61 (1954); Adansonia, ser. 2, 6: 358 (1966), quoad specimen *Kerr 10252 et 10428*.
- *Cylindroclupha robinsonii* auct. non (GAGNEPAIN) KOSTERMANS: KOSTERMANS, Adansonia, ser. 2, 6: 360 (1966), quoad specimen *Rock 1998*.

Burma, S. W. Thailand, alt. 700-1000 m. (Fig. 4, 7).

This species was by KOSTERMANS (1954) reduced to synonymy under *A. quocense*, from which it differs clearly in leaf, inflorescence and flower-characters.

25. *Archidendron kerrii* (Gagnepain) I. Nielsen, *comb. nov.*

- *Pithecellobium kerrii* GAGNEPAIN, Bull. Soc. Bot. Fr. 99: 49 (1952); type: *Kerr 21192*, Laos (holo-, P; iso-, BM, K).
- *Abarema kerrii* (GAGNEPAIN) KOSTERMANS, Commun. Forest Res. Inst. 54: 2 (1956).
- *Parabizzia robinsonii* auct. non (GAGNEPAIN) KOSTERMANS: KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 24 (1954), quoad specimen *Henry 9373 A*.
- *Abarema yunnanensis* auct. non KOSTERMANS: KOSTERMANS, Adansonia, ser. 2, 6: 363 (1966), quoad specimen *Henry 9373 B*.

S. China, Laos, ?N. Vietnam; alt. 500-1600 m. (Fig. 4, 8).

The specimens *Tsang 22096* (BM, P) from Kwangsi and *Eberhardt 4713* (P) from N. Vietnam are in bud only. They are probably conspecific with this species.

The type has only the reduced upper leaves with 1 pair of leaflets on each pinna, while the Chinese specimens examined have up to 3 pairs of leaflets.

26. *Archidendron yunnanense* (Kostermans) I. Nielsen, *comb. nov.*

- *Abarema yunnanensis* KOSTERMANS, *Adansonia*, ser. 2, 6: 362 (1966); type: *Tsai 55250*, China, Yunnan (holo-, L).

China (Yunnan); alt. 1200 m.

No fully developed flowers were seen in the type. This may be the reason why the observed length of the staminal tube is that short. According to KOSTERMANS, the flowers should be glabrous, a character I have not been able to confirm. More material is needed before this species can be described properly.

27. *Archidendron eberhardtii* I. Nielsen, *sp. nov.*

- *Cylindrokelupha platyphylla* auct. non KOSTERMANS: KOSTERMANS, *Reinwardtia* 5: 247 (1960), *quoad specimen Poilane 1650*.
— *Cylindrokelupha robinsonii* auct. non (GAGNEPAIN) KOSTERMANS: KOSTERMANS, *Adansonia*, ser. 2, 6: 360 (1966), *quoad specimen Poilane 1650*.

Ramuli et rachides foliolorum angulares alatique. Inflorescentiae in ramis veteribus infra folia. Pedunculi breves, 6-7 mm longi, in axi principali aggregati, capitula 4-5-flova 11-12 mm longa, floribus sessilibus, gerentes. Legumen lignosum, turgidum, semina subcylindrica, bitruncata, sclerotesta indurata, continens.

TYPUS: *Eberhardt 4081*, Cho Bo, Hoa Binh, N. Vietnam, fl. (holo-, P).

PARATYPUS: *Poilane 1650*, Phong Y, Thanh Hoa, N. Vietnam, fr. (P).

Tree up to 15-18 m high (acc. to EBERHARDT). Branchlets glabrous, 5-angulate, winged by 1 mm broad wings.

Leaves: Rachis 12 cm long, 2-4 mm broad and 4-6 mm high, angulate, laterally compressed, distinctly 4-winged by up to 2 mm broad wings, glabrous. Rachis-glands ca. 1.5 cm from the base and between the bases of the pinnæ ca. 3 mm high and 3-4 mm broad, sessile, urceolate, hollow. Pinnæ 2 pairs, glabrous, proximal pair 6 cm long with 3 pairs of leaflets, distal pair up to 15 cm long with 4 pairs of leaflets. Leaflets opposite, petiolulate, petiolule ca. 4 mm long, 5-9 × 8-18 cm, ovate to elliptical; base rounded symmetrical; apex obtuse, acuminate; both surfaces with prominent primary and secondary veins and anastomosing tertiary veins, glabrous.

Inflorescences on old branches below the leaves, a cluster of narrow panicles, 4 together. Rachis up to 20 cm long, glabrous, striate to angulate, with clusters of serially arranged short peduncles. Peduncles 6-7 mm long, faintly puberulous with heads of ca. 4-5 sessile flowers.

Flowers: Calyx 3 mm long, lower diameter 1 mm, upper 2.25 mm, cup-shaped, glabrous to very faintly puberulous; teeth up to 1 mm long, broadly triangular. Corolla 11-12 mm long, funnel-shaped, finely sericeous; lobes 3-3.5 mm long, ovate-elliptical, acute. Staminal tube as long as

the corolla tube, 8-8.5 mm long. Ovary 2.5 mm long and 0.5 mm broad, glabrous, stipitate, stipe 4 mm long.

Pod (*Poilane 1650*) ca. 20 cm long and 2.8-3 cm diam., turgid, woody, glabrous, dehiscing along both sutures. Sutures deeply sunken. Valves ca. 3 mm thick. Seeds ca. 7, funiculate, funicle 8 mm long and 1.5 mm thick. Seeds irregularly shaped occupying the whole cavity of the pod, up to 20 mm long and 18 mm in diameter, irregularly cylindrical, bitruncate; testa a brownish sclerotesta. — Pl. 1.

N. Vietnam (Fig. 4, 8).

28. *Archidendron* sp. 1.

Shrub. Branchlets with greyish bark, glabrous, terete.

Leaves: Rachis ca. 1 cm long, 1 mm thick, terete, glabrous; gland between the bases of the pinnae ca. 0.5 mm in diam., circular, flat. Pinnae 1 pair, 6-7 cm long 0.5-0.75 mm thick, glabrous; gland between the bases of the petiolules ca. 0.5 mm long, flat, elliptical. Leaflets 2 pairs, opposite, petiolulate, petiolules ca. 0.5 mm long, ca. 4 × 9 cm, elliptic-lanceolate, base cuneate, apex acuminate; upper surface with prominent midrib and inconspicuous secondary and tertiary veins, glabrous; lower surface with prominent primary and secondary veins and prominulous non-reticulate, tertiary veins, glabrous.

Inflorescence? Flowers?

Pod up to 1.5 × 9 cm, turgid, compressed, oblong, dehiscing along both sutures; valves blackish (when dry), glabrous, with inconspicuous venation, inside greyish. Seeds up to 10, filling out the cavity of the pod, very shortly funiculate, 0.6 cm long, 1.5 cm broad, 0.6 cm thick, narrow elliptical, disc-like; testa hard (?), black, crustaceous sclerotesta.

S. VIETNAM: *Schmid s.n.*, Phuoc Tuy, Binh Gia, P.

This specimen might represent a new species, but in lack of the inflorescence and flowers I have hesitated to describe it as such. The seeds and pods remind slightly of the other Indo-Chinese species with cylindrical pods and disc-like seeds, especially those of *A. kerrii* from Laos and S. China.

29. *Archidendron quocense* (Pierre) I. Nielsen, *comb. nov.*

— *Pithecolobium quocense* PIERRE, Fl. Cochinch. 6, tab. 396 (1899); type: *Pierre 3359*, S. Vietnam, Phu Quoc (holo., P).

— *Abarema quocensis* (PIERRE) KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 61 (1954), p.p.; *Adansonia*, ser. 2, 6: 358 (1966), p.p., excl. *P. conspicuum* CRAIB.
— *Pithecolobium jiringa* auct. non (JACK) PRAIN: CRAIB, Fl. Siam. En. 1: 559 (1928), *quoad specimen Kerr 9214*, *Put 545*.

S. E. Thailand, Cambodia, S. Vietnam, alt. sea level-600 m. (Fig. 5, 9).

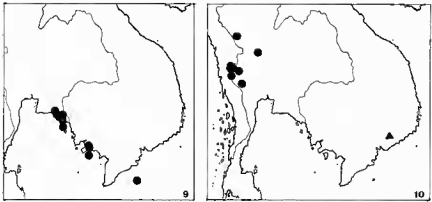


Fig. 5. — Distribution of Archidendron : 9, *A. quocense* (Pierre) I. Nielsen ●. — Pithecellobium : 10, *P. tenue* Craib ●, *P. vietnamense* I. Nielsen ▲.

This species is very close to *A. jiringa* but the calyx is narrower and glabrous; the corolla lobes erect with inconspicuous venation, while the corolla lobes of *A. jiringa* are reflexed with distinct veins; the leaflet surfaces with distinct reticulate venation pattern.

Poilane 35569 (P) from Dak To, S. Vietnam is very close to this species. It has leaf rachis 6-7 cm long with a small subglobose gland 3-4 mm below the bases of the pinnae; calyx 3.5 mm long and corolla 6 mm long with 1.5 mm long ovate, acute lobes.

30. *Archidendron jiringa* (Jack) I. Nielsen, *comb. nov.*

- *Mimosa jiringa* JACK, Malayan Misc. 1: 14 (1820); type: *Jack s.n.*, "Native of Sumatra and the Malay Peninsula" (holo-, E; iso-, L).
- *Zygia jiringa* (JACK) KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20: 27 (1954).

Burma, Thailand, Malaya, Sumatra, Java, Borneo; alt. sea level-ca. 1000 m.

KOSTERMANS (1954) stated that the type of this species is from Penang, the label of JACK only reads: "Native of Sumatra and the Malay Peninsula".

The inflorescences of this species are not only found below the leaves as stated by KOSTERMANS, but often also in the axils of the young leaves.

31. *Archidendron turgidum* (Merrill) I. Nielsen, *comb. nov.*

- *Pithecellobium turgidum* MERRILL, Philipp. J. Sci., Bot. 15: 239 (1919); type: *Levine & Groff 86*, China (PNH?, photo-, A).

- *Paralbizzia turgida* (MERRILL) KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesie 20: 23 (1954).
- *Albizzia croizatiana* METCALF, Lingnan Sci. J. 19: 549 (1940); type : *Ching 6960*, China, Kwangsi (holo-, A; iso-, NY).

S. China, N. Vietnam; alt. 1300-1900 m.

The type *Levine & Groff 86* was probably destroyed in Manila during World War II, but a photo of it was studied through the courtesy of the directors of the Arnold Arboretum. *Levine 1976* should according to the protologue of MERRILL be from the same tree, it is in bud only but has fully mature seeds. It should perhaps be chosen as type if *Levine & Groff 86* does not exist any more.

PITHECELLOBIUM Martius

[Hort. Reg. Acad. Monac.: 188 (1825), *nomen*]; Flora 20, 2, Beibl.: 115 (1837); *nom. cons.* against *Zygia* BOEHMER (1760); type: *P. unguis-cati* (L.) BENTHAM, *typus cons.*

— *Thailentadopsis* KOSTERMANS, Ceyl. J. Sci., Biol. Sci. 12: 131 (1977); type: *T. tenuis* (CRAIB) KOSTERMANS.

Trees or shrubs armed with stipular thorns. Leaves bipinnate, most often with glands on petiole, rachis and pinnæ, not sensitive; leaflets opposite.

Inflorescences of flowers in pedunculate heads or spikes, which are axillary or arranged in terminal or axillary, not cauliflorous panicles. Flowers in the head uniform ♂: calyx gamosepalous, valvate 5-toothed, corolla gamopetalous, valvate, 5-lobed; stamens numerous, the filaments united into a tube, ovary 1, stalked, glabrous or puberulous.

Pod straight or curved, valves chartaceous, irregularly or regularly dehiscent with or without aril, with a hard sclerotesta with pleurogram.

Ca. 15 species in Ceylon, Thailand, S. Vietnam and C. & S. America.

The genus *Thailentadopsis* Kostermans (1977) based on *Pithecellobium tenue* Craib from W. Thailand is highly probably congeneric with the Ceylonese *Painteria nitida* (Vahl) Kostermans and the American *Pithecellobium sensu stricto*, sharing their spine-, flower and seed characters.

The name suggests an affinity to the genus *Entada*. There is no such affinity. The flowers of *P. tenue* have a distinct staminal tube, the anthers are glandless, and the pods have no endocarp remaining as an envelope around the seeds. The only difference between *Painteria-Thailentadopsis* and *Pithecellobium sensu stricto* is that the two former lack the aril around the lower part of the seeds.

KEY TO THE SPECIES

1. Petiole and rachis unwinged 1. *P. dulce*
1'. Petiole and rachis winged.
2. Branchlets triangulate to quadrangulate, distal pair of pinnæ with up
to 3 pairs of leaflets 2. *P. tenue*
2'. Branchlets terete; distal pair of pinnæ with up to 6 pairs of leaflets
..... 3. *P. vietnamense*

1. *Pithecellobium dulce* (Roxburgh) Benth

London J. Bot. 3: 213 (1844).

- *Mimosa dulcis* ROXBURGH, Pl. Corom. 1: 67, tab. 99 (1798); type: *Roxburgh s.n.*,
s. loc. (holo-, K).

Central America, introduced and naturalized all over tropical Asia,
especially in the dry regions.

2. *Pithecellobium tenue* Craib

Kew Bull. (1927): 394; type: *Kerr 6095*, Thailand (holo-, ABD; iso-, BM, E, K).

- *Acacia tenue* (CRAIB) KOSTERMANS, Bull. Organ. Natuurw. Onderz. Indonesië 20:
69 (1954).

- *Thalettadopsis tenuis* (CRAIB) KOSTERMANS, Ceyl. J. Sci., Biol. Sci. 12: 131 (1977).

W. Thailand (endemic); alt. 200-900 m. (Fig. 5, 10).

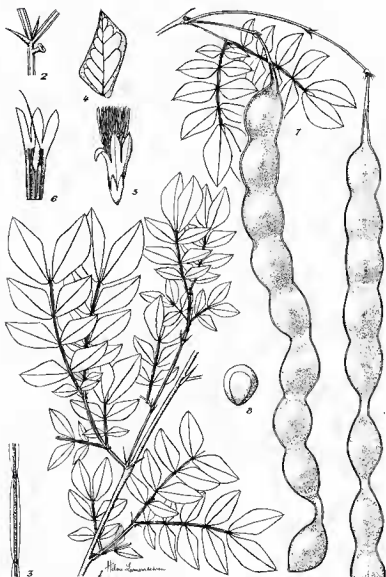
3. *Pithecellobium vietnamense* I. Nielsen, *sp. nov.*

A P. tenui Craib differt ramulis teretibus, tubo staminum brevioribus quam tubo corollæ
seminibusque 11-11.5 mm longis, 9.5-10 mm latis, 6 mm crassis, suborbicularibus.

TYPE: *Schmid s.n.*, Col Blao, Long Khanh, S. Vietnam, alt. 700 m (holo-, P).

Shrub. Branchlets terete only shortly ridged by decurrent ridges from
the stipular thorns. Bark brownish with light lenticels, puberulous,
glabrescent.

Leaves with stipular thorns. Thorns up to 1.3 cm long erecto-patent.
Rachis up to 2 cm long winged by ca. 0.5 mm broad wings and with a pair
of 0.5 cm long erecto-patent stipellate thorns at the bases of the pinnæ.
Rachis glands between the bases of the pinnæ, stipitate, stipe 0.5 mm long,
circular, urceolate, hollow, ca. 1 mm diameter. Pinnæ 1-2 pairs, opposite,
terminated by a 3-4 mm long spine, the proximal pair up to 2 cm long,
the distal up to ca. 4 cm long, slightly winged, wings up to 0.5 mm broad,
faintly puberulous; proximal pinnæ with up to 5 pairs of leaflets, distal
up to 6 pairs. Leaflets sessile, opposite, 0.7-1.5 × 1.5-2.5 cm, rhomboid
to trapezoid, asymmetric, the proximal smaller than the distal ones, base



Pl. 2. — *Pithecellobium vietnamense* Nielsen (Schmid s.n., type) : 1, sterile branch $\times 2/3$; 2, petiolar gland and stipellate thorns $\times 3$; 3, leaf-rachis $\times 2$; 4, leaflet seen from below $\times 1$; 5, flower $\times 4$; 6, section of flower showing staminal tube and ovary $\times 5$; 7, pods $\times 2/3$; 8, seed $\times 1$.

half rounded-half cuneate; apex rounded, mucronate by a 0.5 mm long mucro. Leaflets thinly chartaceous, both surfaces glabrous prominently pinnately veined.

Inflorescence unknown.

Flowers sessile. Calyx 2 mm long, lower diameter 0.5 mm, upper 1 mm, cup-shaped, glabrous; teeth 0.75 mm long, narrow triangular. Corolla 6.5 mm long, funnel-shaped, glabrous; lobes 2.5-3 mm long, reflexed, elliptical, acute, glabrous. Staminal tube ca. 2.5 mm long, distinctly shorter than the corolla tube. Ovary glabrous, 1.5 mm long, 0.3 mm broad, stipitate, stipe 3 mm long.

Pod distinctly stalked, stalk 1.5-2 cm long, ca. 25 cm long, 1.7 cm broad over the seeds and down to 0.2 cm broad between them, up to 0.8 cm thick, strap-shaped, straight with slightly thickened margins, gradually narrowing in the stalk. Valves divided in 1-seeded pseudosegments, dehiscing along both sutures, brownish outside and whitish inside, glabrous, prominently veined on the outer surface.

Seeds 9-10 inconspicuously funiculate, 11-11.5 mm long, 9.5-10 mm broad, 6 mm thick, suborbicular, biconvex, with a thick, brown, shining sclerotesta; pleurogrammate, with the *linca fissura* running parallel to the margins of the seed ca. 6 mm broad and 9 mm long open in the micropylar end. — Pl. 2.

S. Vietnam, alt. 700 m (Fig. 5, 10).

EXCLUDED SPECIES AND DUBIOUS NAMES

1. *Pithecolobium harmandianum* Pierre, Fl. Cochinch. 5: tab. 394A (1898) = *Acacia harmandiana* (Pierre) Gagnepain.
2. *P. indicum* Léveillé, Fl. Kouy-Tcheou: 241 (1914-15) is based on the numbers: *Bodinier 2375* & *Cavalerie 2613*. I have not been able to trace any of these numbers. LÉVEILLÉ (*l. c.*) writes: « La graine grosse comme une cerise, d'abord insipide, laisse ensuite dans la bouche un goût très agréable ». KOSTERMANS (1954: 69) discussed the identity and wrote that it perhaps was not Leguminous at all. I am not quite sure of that because both *A. clypearia*, *A. lucidum* and *A. utile* which all occur in S. China have seeds with the size of a small cherry.
3. *P. mekongense* Pierre, Fl. Cochinch. 5: tab. 396B (1899) = *Acacia harmandiana* (Pierre) Gagnepain.

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